

BESD Newsletter January 2011

Pubs and Products

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Hanson, P. J., Childs, K. W., Wullschlegel, S. D., Riggs, J. S., Thomas, W. K., Todd, D. E. and J. M. Warren. 2011. A method for experimental heating of intact soil profiles for application to climate change experiments. *Glob. Change Biol.* 17: 1083-1096.

Iversen, C. M., Hooker, T., Classen, A. T., and R. J. Norby. 2011. Net mineralization of N at deeper soil depths as a potential mechanism for sustained forest production under elevated [CO₂]. *Glob. Change Biol.* 17: 1130-1139.

Luo, Y., Melillo, J. M., Niu, S., Beier, C., Clark, J., Davidson, E., Dukes, J., Evans, R. D., Field, C. B., Czimczik, C., Keller, M., Kimball, B. A., Kueppers, L., Norby, R. J., Pelini, S., Pendall, E., Rastetter, E., Six, J., Smith, M., Tjoelker, M. G., and M. S. Torn. 2011. Coordinated approaches to quantify long-term ecosystem dynamics in response to global change. *Glob. Change Biol.* 17: 843-854.

Reports from the California Air Resources Board Low Carbon Fuel Standard Expert Work Group (CARB LCFS EWG) on land-use change were posted on January 12th. During CY2010, ORNL made substantive contributions to EWG discussions and drafts. The final EWG reports are

accessible to the public here:

<http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/expertworkgroup.htm>

Tomanicek, S. J., Weiss, K. L., Wang, K. K., Blakeley, M. P., Cooper, J., Chen, Y., and L. Coates. 2011. The active site protonation states of perdeuterated Toho-1 β -lactamase determined by neutron diffraction support a role for Glu166 as the general base in acylation. *FEBS Lett.* 585: 364-368.

Paquit, V. C., Gleason, S. S., and U. C. Kalluri. 2011. Monitoring plant growth using high resolution micro-CT images. *Proceedings of Image Processing: Machine Vision Applications IV (SPIE Electronic Imaging Symposium)* 7877-33.

Torres-García, W., Brown, S. D., Johnson, R. H., Zhang, W., Runger, G. C., and D. R. Meldrum. 2011. Integrative analysis of transcriptomic and proteomic data of *Shewanella oneidensis*: missing value imputation using temporal datasets. *Mol. Biosyst.* Available online. DOI: 10.1039/C0MB00260G

Xu, C., Liang, C., Wullschleger, S., Wilson, C., and N. McDowell. 2011. Importance of feedback loops between soil inorganic nitrogen and microbial communities in the heterotrophic soil respiration response to global warming. *Nat. Rev. Microbiol.* Available online. DOI:10.1038/nrmicro2439-c1

Yang, X., Ye, C.-Y., Bisaria, A., Tuskan, G. A., and U. C. Kalluri. 2011. Identification of candidate genes in *Populus* cell wall biosynthesis using text-mining, co-expression network and comparative genomics. *Plant Sci.* Available online. DOI:10.1016/j.plantsci.2011.01.020

Notable Achievements

Martin Keller was quoted on the future of biofuels in the Knoxville News Sentinel blog “Atomic City Underground.” You can view the article online at:

http://blogs.knoxnews.com/munger/2010/10/biofuels_10_years_from_now.html.

The BioEnergy Science Center (BESC) was featured in the Oak Ridge National Laboratory (ORNL) publication “ORNL Review” (Vol. 43, No. 3). The issue highlighted BESC on the mission to revolutionize the production of biofuels and the key to the progress of BESC’s inter-disciplinary approach to research and development. Contributing BESC members; Dr. Paul Gilna, Dr. Martin Keller, Dr. Jerry Tuskan and Dr. Ramesh Bhawe. You can view the article online at: <http://www.ornl.gov/info/ornlreview/>.

Paul Gilna presented “Overcoming Recalcitrance in Plants to Generate Biofuels from Cellulosic Biomass: A Study in Large-Scale Scientific Collaboration,” an invited lecture, to students at Demark Technical University, Copenhagen, November 17th.

Ranjeet Devarakonda co-convened a session with Chris Lynnes (National Aeronautics and Space Administration [NASA]/Goddard Space Flight Center [GSFC]) and Rahul Ramachandran (ORNL) on "Collaborative Frameworks in Earth and Space Sciences" at the 2010 American Geophysical Union (AGU) Annual Conference. Ranjeet also gave a talk on the Mercury search system at the NASA Booth and presented a poster.

ORNL Distributed Active Archive Center (DAAC) Manager, Chris Lenhardt, and Deputy Manager, Tammy Walker, attended the Earth Science Information Partners (ESIP) Federation Winter Meeting, January 4th-6th, in Washington, D.C.

- Tammy participated in the Metadata Evolution for NASA Data Systems (MENDS, a.k.a., ISO 19115 Tiger Team) Phase 1 wrap-up meeting held on Thursday, January 6th. Final recommendations for the report entitled “MENDS Tiger Team Recommendations to ESDIS Project” were discussed, the report is due to be published by January 31st.
- Chris was elected president of the ESIP Federation for 2011.
- Chris also participated in a constituent roundtable hosted by the NOAA Satellite and Information Service with Mary Kicza, Assistant Administrator for Satellite and Information Services.

Shahab Sokhansanj organized a session “Biomass Equipment: Supply Systems to Handle and Deliver Feedstocks for Cellulosic Biofuels Production” at the 2011 Agricultural Equipment Technology Conference on January 7th in Atlanta. The session featured presentations by principal investigators of the five DOE-sponsored high-tonnage bioenergy feedstock demonstration projects. Following the technical session, Shahab Sokhansanj, Robin Graham and Erin Webb hosted a luncheon for the five logistics project leaders and DOE staff to discuss future collaboration opportunities.

Udaya Kalluri has accepted new responsibilities as Science Coordinator for the Department of Energy (DOE) BioEnergy Science Center (BESC). In this capacity, Udaya will be coordinating information on BESC science activities and developments, and also help with communicating research highlights to stakeholders and to the community. She will continue with her research in the Plant Systems Biology group.

Yetta Jager visited Argonne on January 10th-11th to meet with Drs. John Hayse and Kenneth Ham to coordinate efforts to develop methods for optimizing hydropower facilities to maximize environmental performance as well as energy values. Discussions clarified the role of seasonal and day-ahead scheduling models with which we plan to integrate environmental measures. They outlined three primary measures and approaches with general relevance to U.S. hydro projects.

On January 11th Yetta Jager visited with May Wu and Eugene Yan at Argonne as part of a collaborative research effort to forecast water quality and aquatic biodiversity changes associated with incorporating bioenergy crops into the agricultural landscape.

Vince Neary hosted the Tidal and Ocean Current Resource Assessment Conference Call Meeting with Georgia Tech on January 11th.

ORNL DAAC Chief Scientist, Bob Cook, participated in the North American Carbon Program (NACP) Mid Continent Intensive Workshop in Fort Collins, CO, January 11th-12th.

Natalie Griffiths attended a two-day long workshop (January 13th-14th) at the Konza Prairie Biological Station in Manhattan, Kansas, which focused on modeling nitrogen flow through food webs. The modeling effort included data on the stable isotope (¹⁵N) composition of organisms in Walker Branch that were collected as part of the LINXI project.

Chris Lenhardt, ORNL DAAC Manager, participated as President of the Earth Science Information Partners (ESIP) Federation in a telecon of the Executive Committee.

John Sorensen has been approved as a member of the provisional Committee on Inherently Safer Chemical Processes: The Use of Methyl Isocyanate at Bayer CropScience.

UT-Battelle has made an election decision for the invention disclosure titled “Microbially Facilitated Kesterite Formation for Solar Cell Devices” submitted by Ji-Won Moon, Chad Duty, Ivaylo Ivanov, Lonnie Love, and Tommy Phelps.

On January 17th-18th ORNL DAAC Scientist Bob Cook participated in the Data Observation Network for Earth (DataONE) External Advisory Board Meeting, Santa Fe, NM. Martha Maiden, NASA Headquarters, participated as a member of the External Advisory Board.

On January 18th Keith Kline was asked to submit an overview of the ongoing “Global Sustainability Bioenergy (GSB) Project” to the next issue of the Global Land Project’s “GLP News.” This bi-annual publication is available electronically at <http://www.globallandproject.org/newsletter.shtml>.

Baohua Gu and Liyuan Liang visited the Office of Biological and Environmental Research on January 18th and presented research work under the ORNL Mercury Science Focus Area (SFA). Part of the presentation is based on a recent publication in the Proceedings of the National Academy of Sciences on the dual role of natural organic matter influencing mercury speciation in water.

Also on January 18th Keith Kline participated in the ISO PC-248 “Sustainability Criteria for Bioenergy” Work Group webinar on greenhouse gas emission methods. ORNL facilitated the linkage between this new work group and an ongoing ISO effort to develop standards for the Carbon Footprint of Products.

On January 18th-21st Anthony Turhollow participated in a proposal review for the National Institute of Food and Agriculture (NIFA) of the United States Department of Agriculture (USDA) for the NIFA Agriculture and Food Research Initiative (AFRI) Bioenergy Coordinated Agriculture Project (CAP) Panel in Washington, DC.

On January 19th Robin Graham, Bob Perlack, Budhendra Bhaduri, and Virginia Dale attended the Office of the Biomass Program (OBP) Analysis and Sustainability January Quarterly, Washington, D.C. Several other ORNL staff (Keith Kline, Matt Langholtz, Erin Webb, Esther Parish, Nagendra Singh) participated via Live Meeting.

Brennan Smith, Shelaine Hetrick, and Raymond Boeman attended the DOE Wind Lab Project Managers’ Workshop meeting at Sandia National Laboratory on January 19th-20th. Brennan Smith presented on ORNL capabilities.

Meng-Dawn Cheng participated in the methodology workshop on January 23rd-24th hosted by the U.S. Environmental Protection Agency (EPA) and Federal Aviation Administration at the EPA Research Triangle Park Campus. The committee is working to review the status of current particulate number and mass sampling and measurement technologies for modern aircraft engine design and certification. Similar activities are ongoing in Europe and Asia, and a harmonization workshop will take place in the near future to hopefully establish a mutually agreeable international protocol. Under the same committee, Meng-Dawn is also working in parallel on an Aerospace Recommended Practice that will be promulgated by the Society of Automotive

Engineers (SAE) for sampling and measurement of aircraft engine contaminants in cabin air and bleed air supplies.

Dale Kaiser attended the 91st Annual Meeting of the American Meteorological Society in Seattle, Washington, January 23rd-27th. At the meeting, as part of the 23rd Conference on Climate Variability and Change, he presented the poster "Better Understanding Late-20th Century Cloudiness Changes over China," with coauthor Yun Qian of Pacific Northwest National Laboratory (PNNL). In the 2nd Conference on Climate, Weather, and the New Energy Economy, he gave a talk titled "The Wind ENergy Data and Information (WENDI) Gateway: New Information and Analysis Tools for Wind Energy Stakeholders," coauthored with Giri Palanisamy, Suresh SanthanaVannan, Yaxing Wei, Travis Smith, Michael Starke, Bruce Wilson, and Lyndy Wibking.

On January 25th-28th Anthony Turhollow participated in a proposal review for Genome Canada for 2010 Large-Scale Applied Research Competition in Toronto, Ontario, Canada.

NASA has selected the ORNL DAAC to archive airborne remote sensing data from two Pathfinder Missions. The two recently announced missions are Carbon in Arctic Reservoirs Vulnerability Experiment (CARVE) and Airborne Microwave Observatory of Subcanopy and Subsurface (AirMOSS). These missions will collect and process data over the next five years. At the end of the missions the data products will be archived and distributed by the ORNL DAAC. Additional information about the missions is available on the NASA Web sites:

- Earth System Science Pathfinder Earth Venture Sub-Orbital Investigations <http://science.nasa.gov/about-us/smd-programs/earth-system-science-pathfinder/>
- CARVE: Carbon in Arctic Reservoirs Vulnerability Experiment. This investigation will collect an integrated set of data that will provide unprecedented insights into Arctic carbon cycling especially the release of important greenhouse gases such as carbon dioxide and methane. <http://science.nasa.gov/missions/carve/>
- AirMOSS: Airborne Microwave Observatory of Subcanopy and Subsurface. To better understand the global ecosystem exchange of greenhouse and other gases on a continental scale, this investigation addresses the uncertainties in existing estimates by measuring the soil moisture in the root zones of representative regions of major North American ecosystems. <http://science.nasa.gov/missions/airmoss/>

Latha Baskaran provided Soil and Water Assessment Tool (SWAT) implementation support to Sheila Christopher (Virginia Tech) for a project funded by Catchlight Energy (Chevron & Weyerhaeuser) to understand the environmental effects of intercropping switchgrass in pine plantations.

On January 26th Debo Oladosu presented, "Empirical Analysis of the Sources of Corn Used for Ethanol Production in the United States: 2001-2009" for a meeting and Webinar of stakeholders organized by the National Corn Growers Association (NCGA).

Brennan Smith presented a talk on January 26th at the Georgia Tech Clean Energy Speaker Series at Georgia Tech in Atlanta, GA.

Also on January 26th ORNL staff participated in the Council for Sustainable Biomass Production Field Testing Task Force meeting, supporting efforts to develop practical approaches to measure sustainability for cellulosic bioenergy crops.

On January 27th Jay Chen attended a face-to-face review meeting in Toronto with Genome Canada to discuss a potential collaborative Genome Canada project entitled "POWER: Poplar Omics Widens Energy Resource" between the Queen's University and the BioEnergy Science Center.

The Agriculture and Food Research Initiative (AFRI) Coordinated Agriculture Project (CAP) proposal through the University of Tennessee, Knoxville, has been selected as a finalist. ORNL staff will be engaged in preparing for a reverse site visit in March.

Brennan Smith attended the National Hydropower Association (NHA) meeting in Washington, D.C., on January 27th.

Bob Andres attended the 2011 AmeriFlux Science Meeting & 3rd North American Carbon Program (NACP) All-Investigators Meeting in New Orleans, LA, from January 31st - February 4th. In addition to serving on the program committee, Andres was the lead or co-author on three presentations.

ORNL DAAC Data Specialists, Harold Shanafield and Stefanie Shamblin; Developer, Yaxing Wei; and DAAC Scientist, Bob Cook participated in the NACP Meeting, January 31st-February 3rd, New Orleans, LA.

Sylvia Milanez, of the Toxicology and Hazard Assessment Team, was recently appointed to a 2-year term on the Editorial Advisory Board of the Journal of Applied Toxicology (JAT). Sylvia has been active in reviewing manuscripts for publication in JAT for several years, and will work to promote the quality and impact of the journal during her tenure on the Board.

BESD New Arrivals

John Eblen arrived in January to work as a postdoctoral research associate with Jeremy Smith and Jerry Parks. John will be using software engineering using Eclipse to aid in parallelization of applications for petascale supercomputing. John will work closely with applications users to ease debugging, load balancing and other multiprocessor problems.

Jie Gao arrived in January to work as a postdoctoral research associate with Feng He and Liyuan Liang. Jie will contribute to lab research on synthesis and characterization of nanomaterials and application of the nanomaterials in environmental remediation. Jie will work with a team of scientists on SEED and DOE Environmental Management (EM) projects.

Prasesh Sharma arrived in January to work as a postdoctoral research associate with Melanie Mayes. Prasesh will be working on understanding, quantifying, and predicting the transport of particulate and dissolved MC in realistic vadose-zone conditions. He will help determine the potential for preferential transport by using laboratory-scale soil sample.

Yun Qian arrived in January to work as a postdoctoral research associate on the Mercury SFA project. As an analytical chemist, Yun supports the program in mercury and methyl mercury analyses.